FIG.1

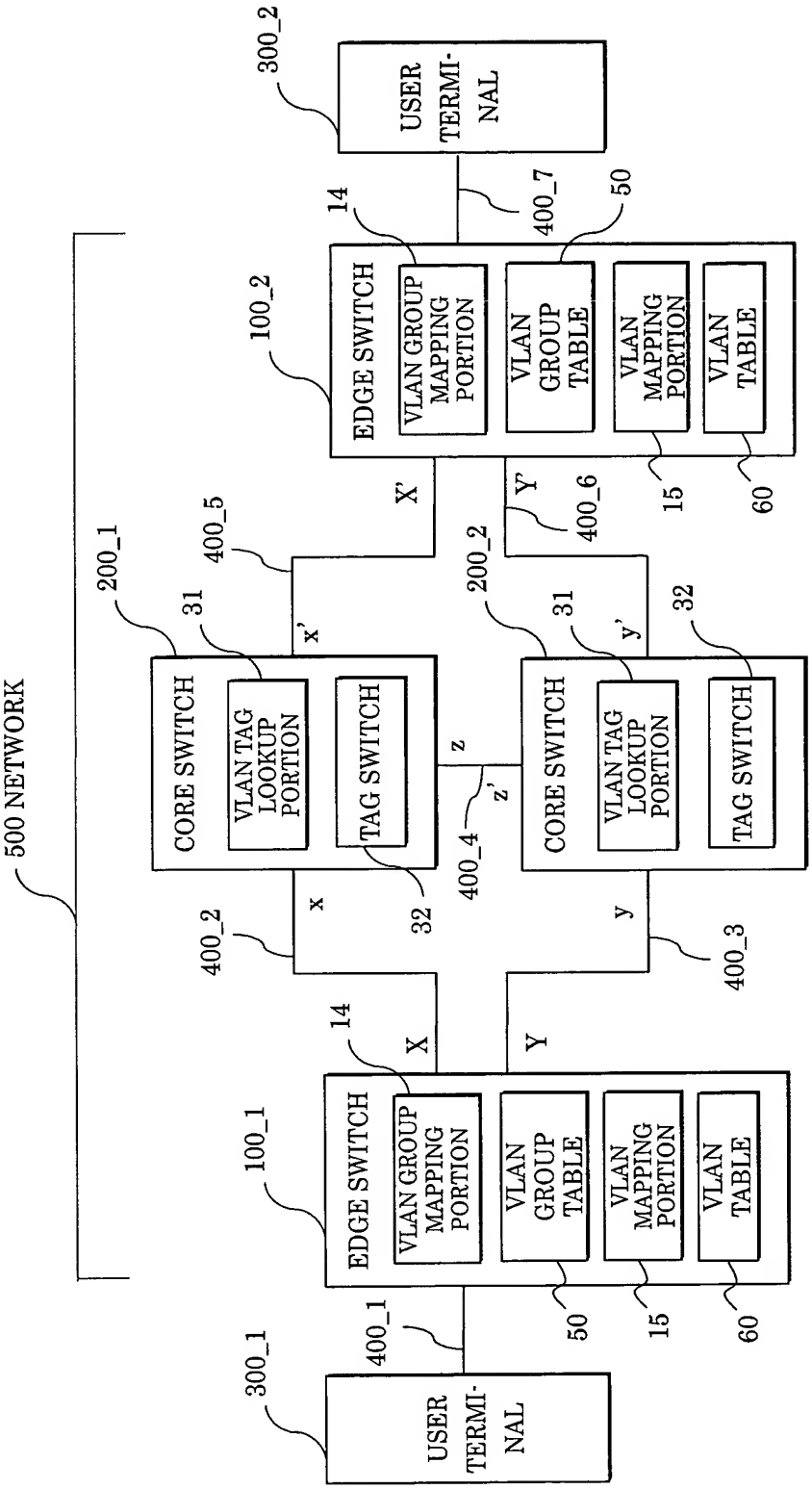

500 NETWORK
USER TERMI-NAL
300_1
400_1
EDGE SWITCH
100_1
VLAN GROUP MAPPING PORTION
VLAN GROUP TABLE
VLAN MAPPING PORTION
VLAN TABLE
14
50
15
60
X
Y
400_2
400_3
CORE SWITCH
200_1
200_2
VLAN TAG LOOKUP PORTION
TAG SWITCH
31
32
x
x'
y
y'
z
z'
400_4
400_5
400_6
X'
Y'
400_7
300_2

FIG.2

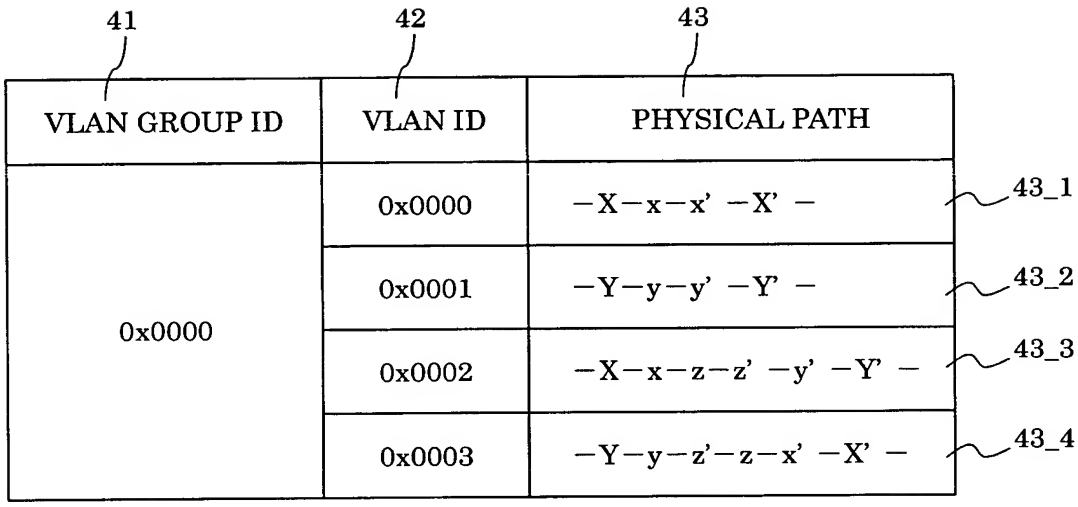


FIG.3

60

61 VLAN GROUP ID	63 VLAN ID	64 OUTPUT PORT
0x0000	0x0000 0x0001 0x0002	NO.1 NO.2 NO.3
0x0001 . . .	0x0010 . . .	NO.2 . . .

FIG.4

50

51 52

INPUT PORT (MAPPING CONDITION)	VLAN GROUP ID
NO.0	0x0000
NO.1	0x0001
NO.2	0x0002
.	.
.	.
.	.

FIG.5

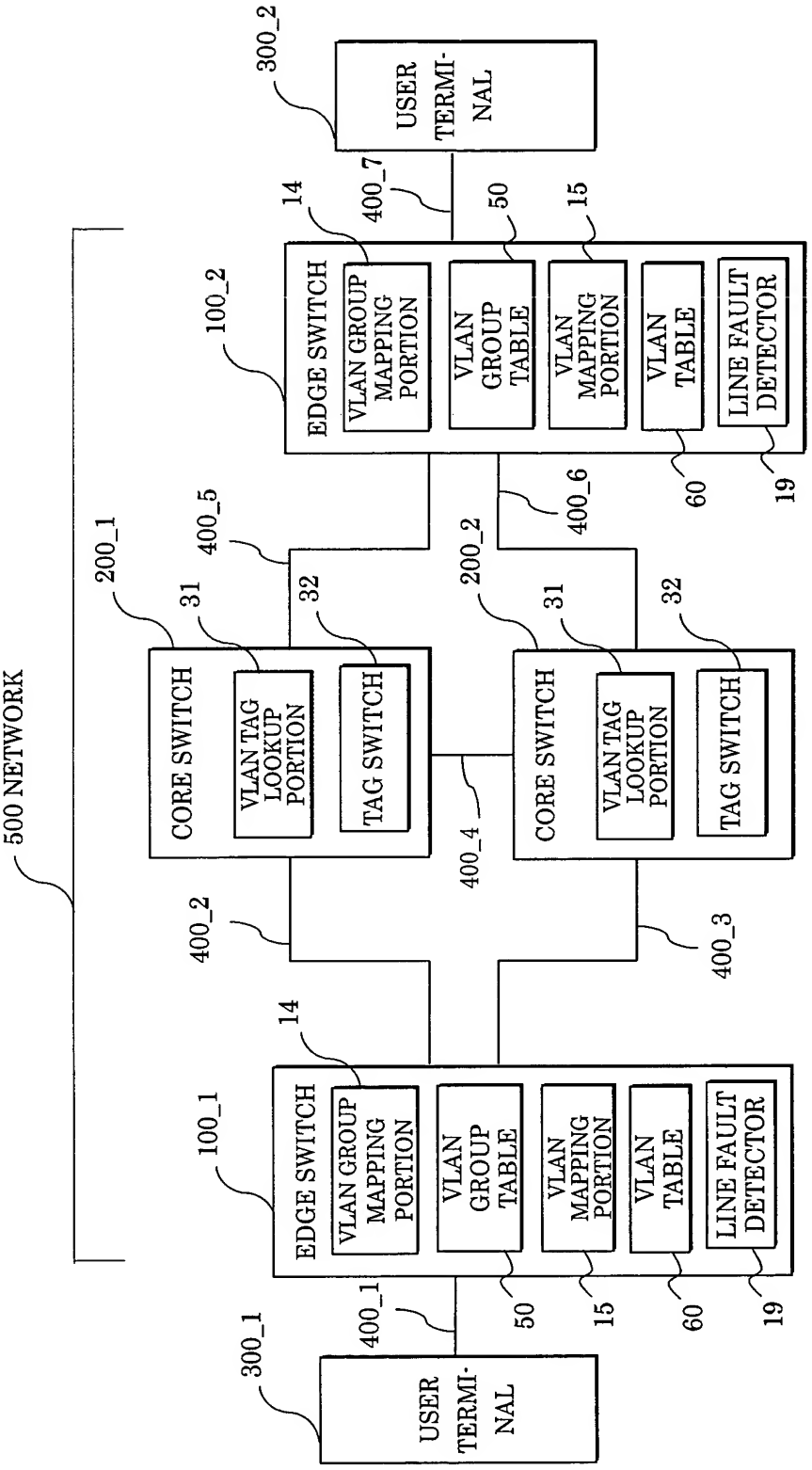

500 NETWORK
200_1
CORE SWITCH
31
VLAN TAG LOOKUP PORTION
32
TAG SWITCH
200_2
CORE SWITCH
31
VLAN TAG LOOKUP PORTION
32
TAG SWITCH
400_4
400_5
400_6
400_2
400_3
100_1
EDGE SWITCH
14
VLAN GROUP MAPPING PORTION
VLAN GROUP TABLE
50
VLAN MAPPING PORTION
15
VLAN TABLE
60
LINE FAULT DETECTOR
19
100_2
EDGE SWITCH
14
VLAN GROUP MAPPING PORTION
VLAN GROUP TABLE
50
VLAN MAPPING PORTION
15
VLAN TABLE
60
LINE FAULT DETECTOR
19
400_1
400_7
300_1
USER TERMI-NAL
300_2
USER TERMI-NAL

FIG.6

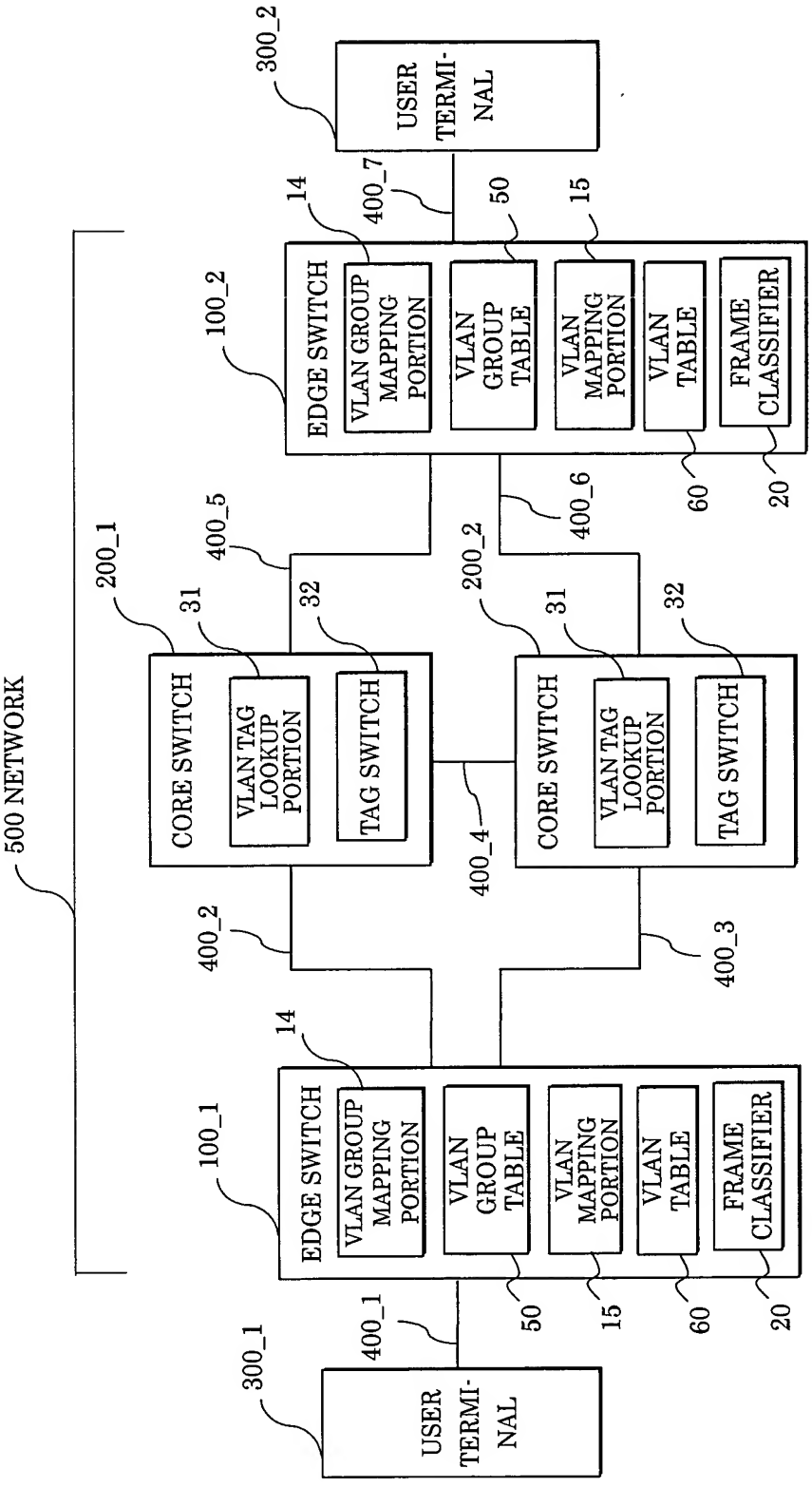

500 NETWORK
USER TERMINAL
300_1
400_1
EDGE SWITCH
100_1
14
VLAN GROUP MAPPING PORTION
VLAN GROUP TABLE
VLAN MAPPING PORTION
VLAN TABLE
FRAME CLASSIFIER
50
15
60
20
400_2
400_3
CORE SWITCH
200_1
200_2
31
32
VLAN TAG LOOKUP PORTION
TAG SWITCH
400_4
400_5
400_6
400_7
EDGE SWITCH
100_2
USER TERMINAL
300_2

FIG.7

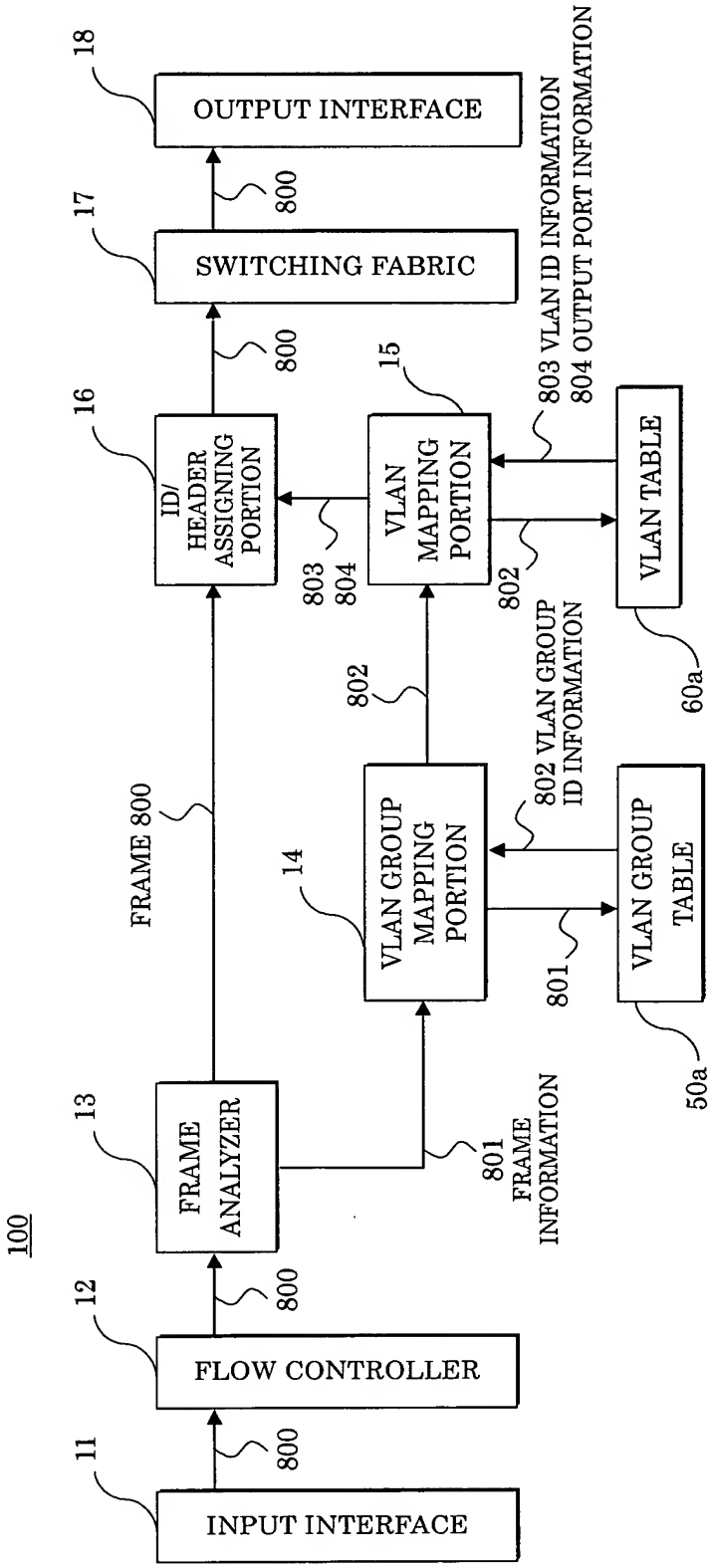

100
11
INPUT INTERFACE
800
12
FLOW CONTROLLER
800
13
FRAME ANALYZER
FRAME 800
801 FRAME INFORMATION
14
VLAN GROUP MAPPING PORTION
802
802 VLAN GROUP ID INFORMATION
VLAN GROUP TABLE
801
50a
15
VLAN MAPPING PORTION
803 VLAN ID INFORMATION
804 OUTPUT PORT INFORMATION
802
VLAN TABLE
60a
16
ID/ HEADER ASSIGNING PORTION
803
804
800
17
SWITCHING FABRIC
800
18
OUTPUT INTERFACE

FIG.8

50a

51 INPUT PORT	52 VLAN GROUP ID	53 EFFECTIVENESS
NO.0	0x0000	1
NO.1	0x0001	1
NO.2	0x0002	1
.	.	.
.	.	.
.	.	.

FIG.9

60a

61 VLAN GROUP ID	62 NUMBER OF ELEMENTS	63 VLAN ID	64 OUTPUT PORT	65 EFFECTIVENESS
0x0000	3	0x0000	NO.1(X)	1
	3	0x0001	NO.2(Y)	1
	3	0x0002	NO.3(X)	1
0x0001	3	0x0010	NO.2	1
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.

FIG.10

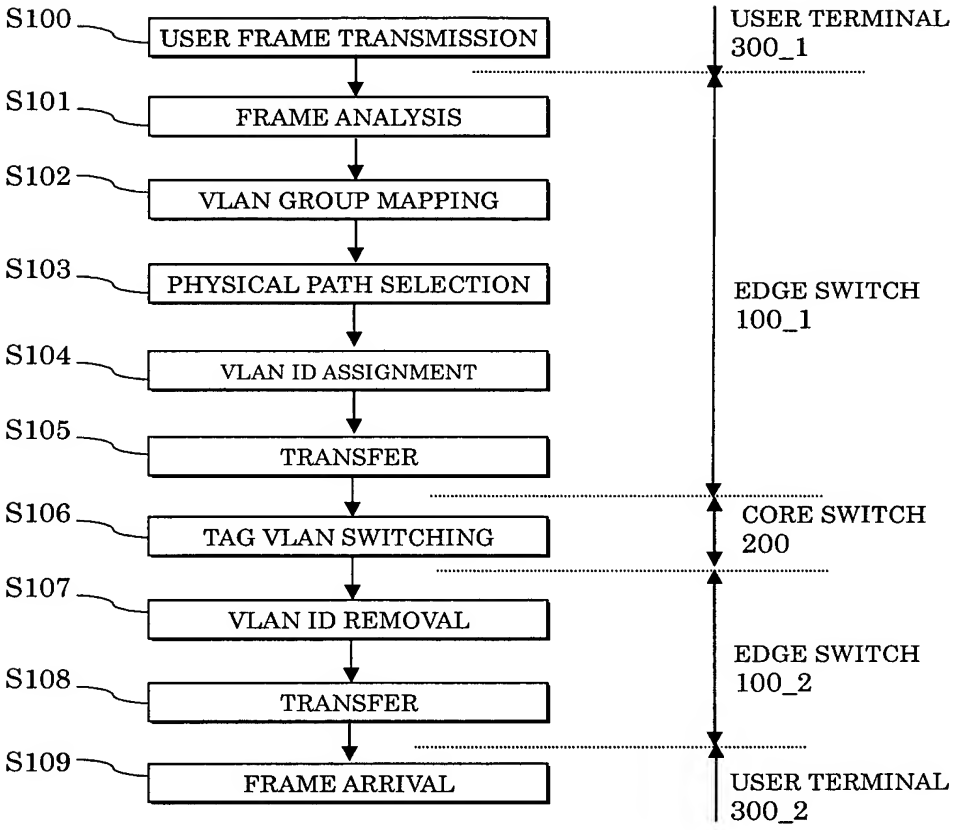

S100
USER FRAME TRANSMISSION
S101
FRAME ANALYSIS
S102
VLAN GROUP MAPPING
S103
PHYSICAL PATH SELECTION
S104
VLAN ID ASSIGNMENT
S105
TRANSFER
S106
TAG VLAN SWITCHING
S107
VLAN ID REMOVAL
S108
TRANSFER
S109
FRAME ARRIVAL
USER TERMINAL 300_1
EDGE SWITCH 100_1
CORE SWITCH 200
EDGE SWITCH 100_2
USER TERMINAL 300_2

FIG.11

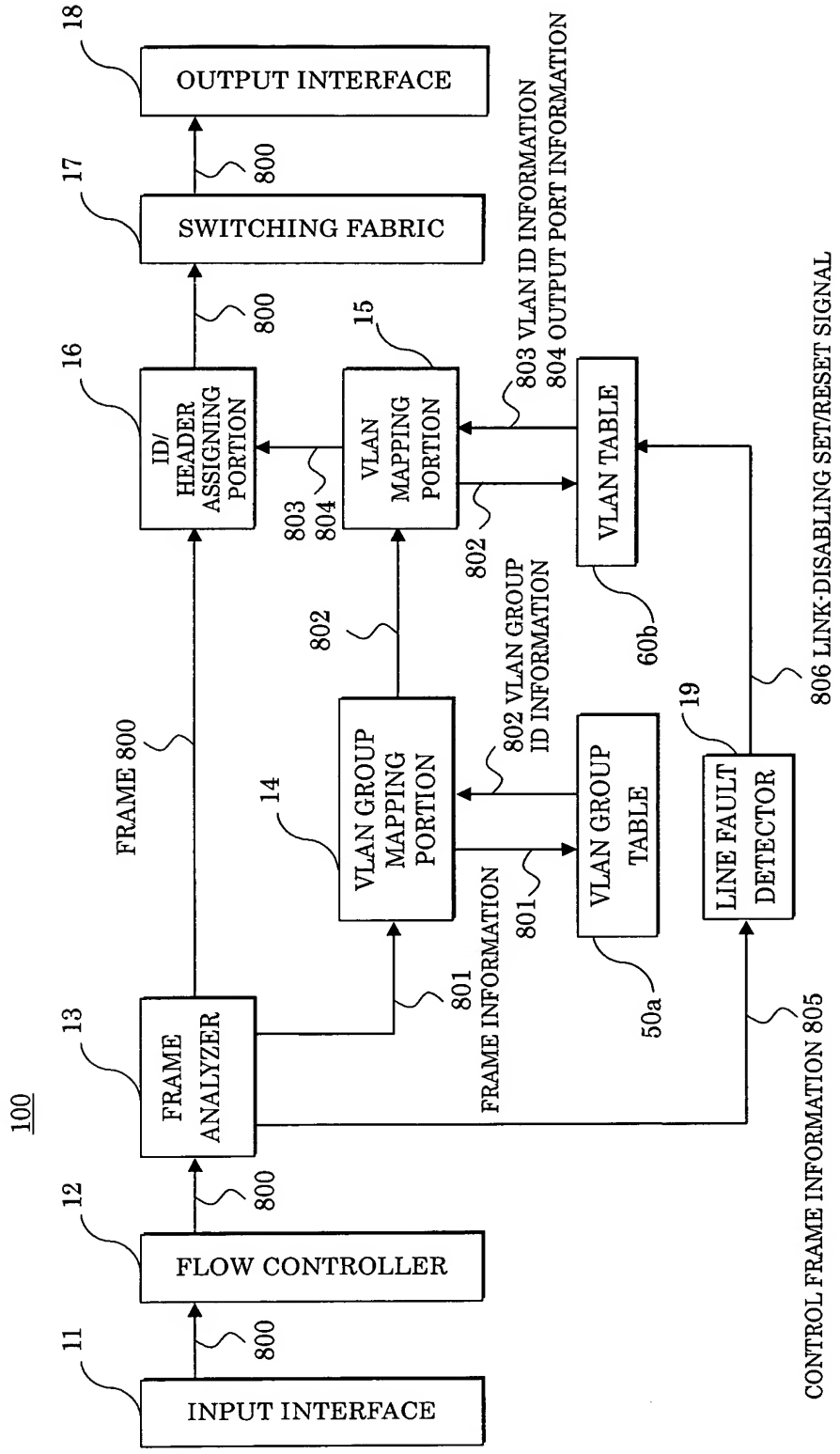

100
INPUT INTERFACE
11
800
FLOW CONTROLLER
12
800
FRAME ANALYZER
13
FRAME 800
801
FRAME INFORMATION
VLAN GROUP MAPPING PORTION
14
802
802 VLAN GROUP ID INFORMATION
VLAN GROUP TABLE
50a
801
LINE FAULT DETECTOR
19
CONTROL FRAME INFORMATION 805
806 LINK-DISABLING SET/RESET SIGNAL
ID/ HEADER ASSIGNING PORTION
16
803
804
VLAN MAPPING PORTION
15
802
803 VLAN ID INFORMATION
804 OUTPUT PORT INFORMATION
VLAN TABLE
60b
800
SWITCHING FABRIC
17
800
OUTPUT INTERFACE
18

FIG.12

60b

61 VLAN GROUP ID	62 NUMBER OF ELEMENTS	66 RANK	63 VLAN ID	64 OUTPUT PORT	65 EFFECTIVENESS	67 LINK DISABLE
0x0000	3	Primary	0x0000	NO.1	1	0→1
	3	Secondary	0x0001	NO.2	1	0
	3	Tertiary	0x0002	NO.3	1	0
0x0001	3	Primary	0x0010	NO.2	1	1
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.		.	.	.	.

FIG.13

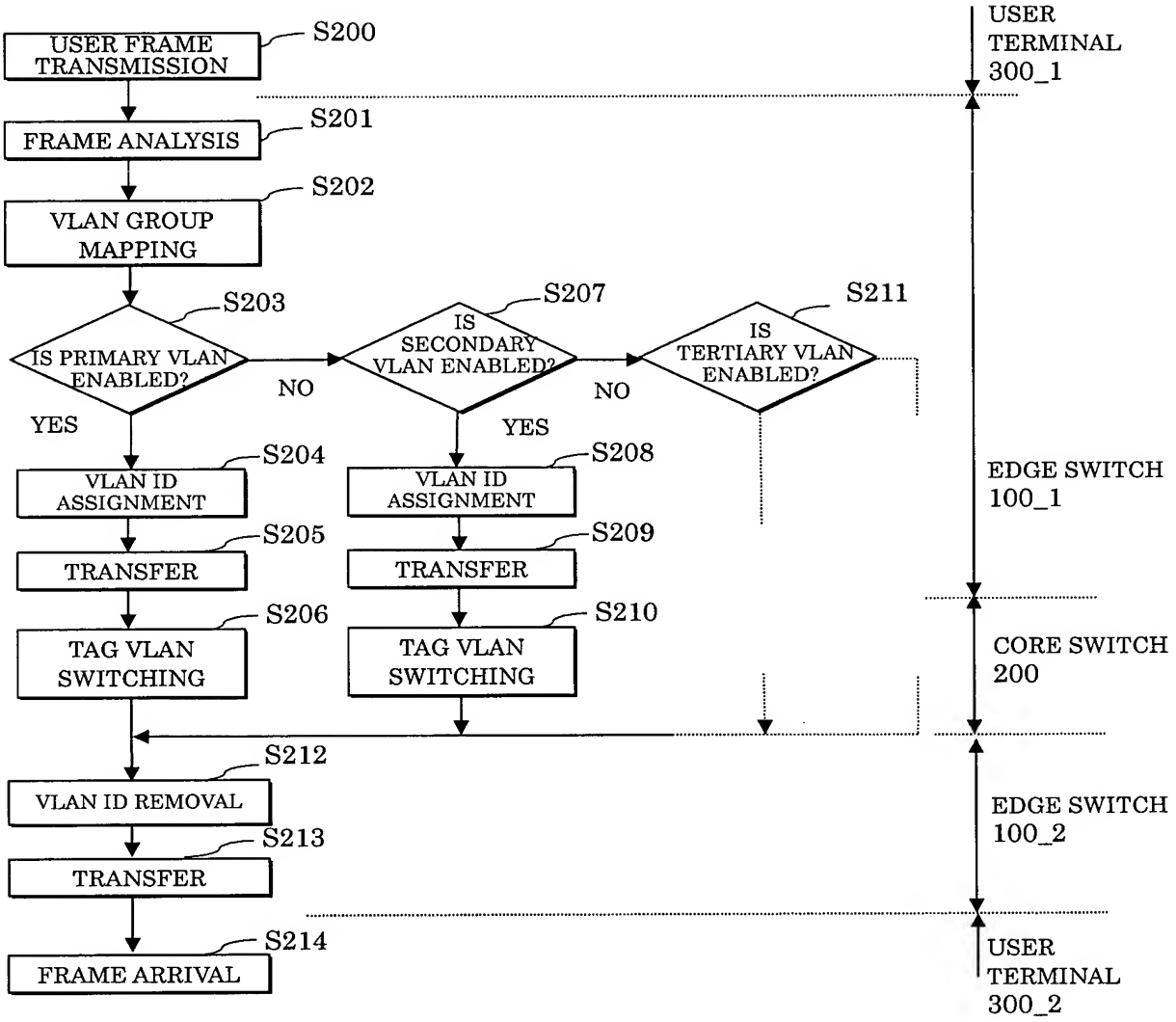

USER FRAME TRANSMISSION
S200
FRAME ANALYSIS
S201
VLAN GROUP MAPPING
S202
IS PRIMARY VLAN ENABLED?
S203
NO
YES
IS SECONDARY VLAN ENABLED?
S207
NO
YES
IS TERTIARY VLAN ENABLED?
S211
VLAN ID ASSIGNMENT
S204
TRANSFER
S205
TAG VLAN SWITCHING
S206
VLAN ID ASSIGNMENT
S208
TRANSFER
S209
TAG VLAN SWITCHING
S210
VLAN ID REMOVAL
S212
TRANSFER
S213
FRAME ARRIVAL
S214
USER TERMINAL 300_1
EDGE SWITCH 100_1
CORE SWITCH 200
EDGE SWITCH 100_2
USER TERMINAL 300_2

FIG.14

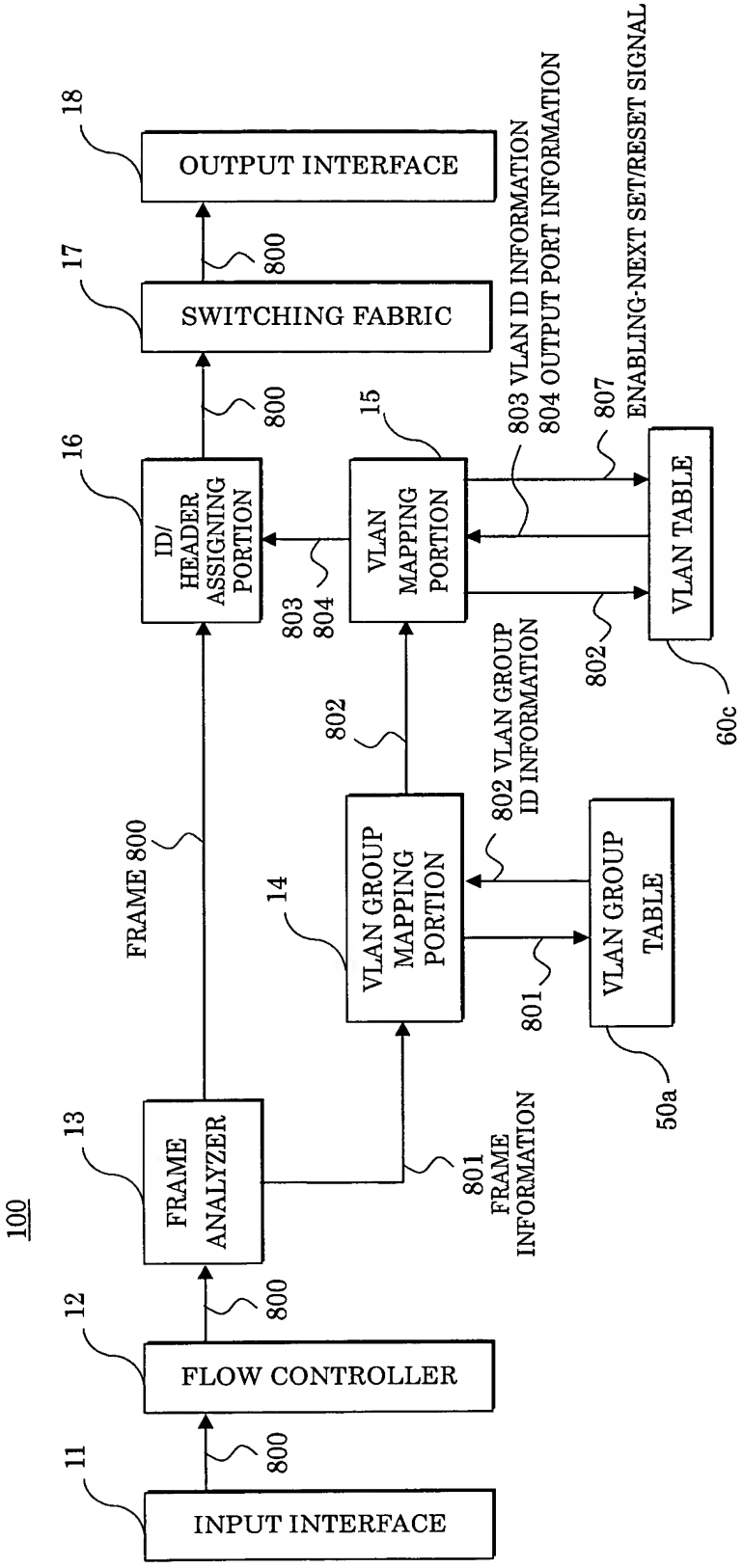

100
11
INPUT INTERFACE
800
12
FLOW CONTROLLER
800
13
FRAME ANALYZER
801 FRAME INFORMATION
FRAME 800
800
16
ID/ HEADER ASSIGNING PORTION
800
17
SWITCHING FABRIC
800
18
OUTPUT INTERFACE
803
804
15
VLAN MAPPING PORTION
803 VLAN ID INFORMATION
804 OUTPUT PORT INFORMATION
807 ENABLING-NEXT SET/RESET SIGNAL
802
14
VLAN GROUP MAPPING PORTION
802 VLAN GROUP ID INFORMATION
801
VLAN GROUP TABLE
50a
802
VLAN TABLE
60c

FIG.15

60c

61 VLAN GROUP ID	62 NUMBER OF ELEMENTS	63 VLAN ID	64 OUTPUT PORT	68 ENABLE NEXT	65 EFFECTIVENESS
0x0000	3	0x0000	NO.1	0	1
	3	0x0001	NO.2	1→0	1
	3	0x0002	NO.3	0→1	1
0x0001	3	0x0010	NO.2	1	1
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.

FIG.16

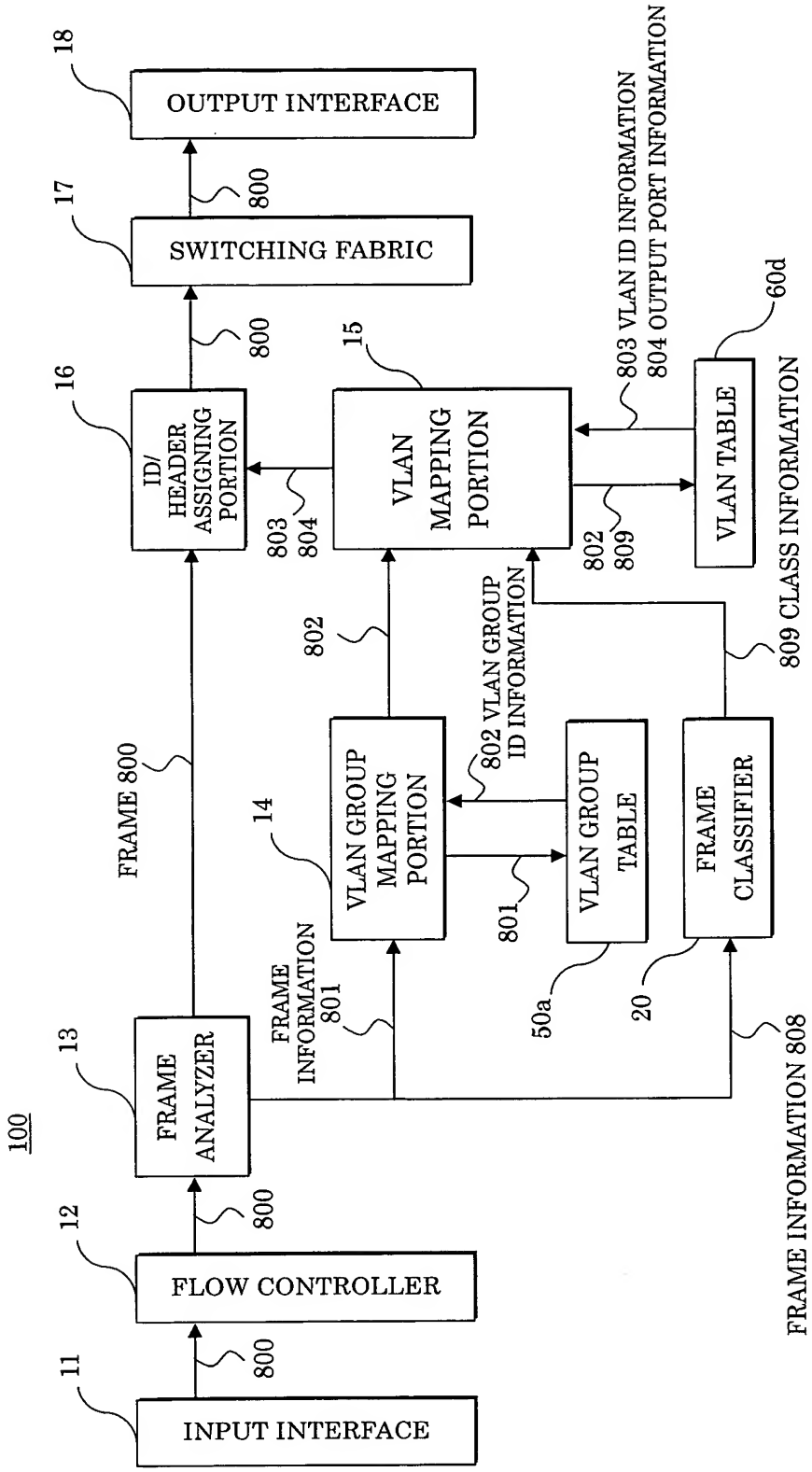

100
11
INPUT INTERFACE
800
12
FLOW CONTROLLER
800
13
FRAME ANALYZER
FRAME 800
FRAME INFORMATION 801
14
VLAN GROUP MAPPING PORTION
802
802 VLAN GROUP ID INFORMATION
801
VLAN GROUP TABLE
50a
20
FRAME CLASSIFIER
809 CLASS INFORMATION
FRAME INFORMATION 808
16
ID/ HEADER ASSIGNING PORTION
803
804
15
VLAN MAPPING PORTION
802
809
803 VLAN ID INFORMATION
804 OUTPUT PORT INFORMATION
60d
VLAN TABLE
800
17
SWITCHING FABRIC
800
18
OUTPUT INTERFACE

FIG.17

60d

61 VLAN GROUP ID	62 NUMBER OF ELEMENTS	63 VLAN ID	69 CLASS	64 OUTPUT PORT	65 EFFECTIVENESS
0x0000	3	0x0000	8	NO.1	1
	3	0x0001	3	NO.2	1
	3	0x0002	4	NO.3	1
0x0001	3	0x0010	1	NO.2	1
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.

FIG.18

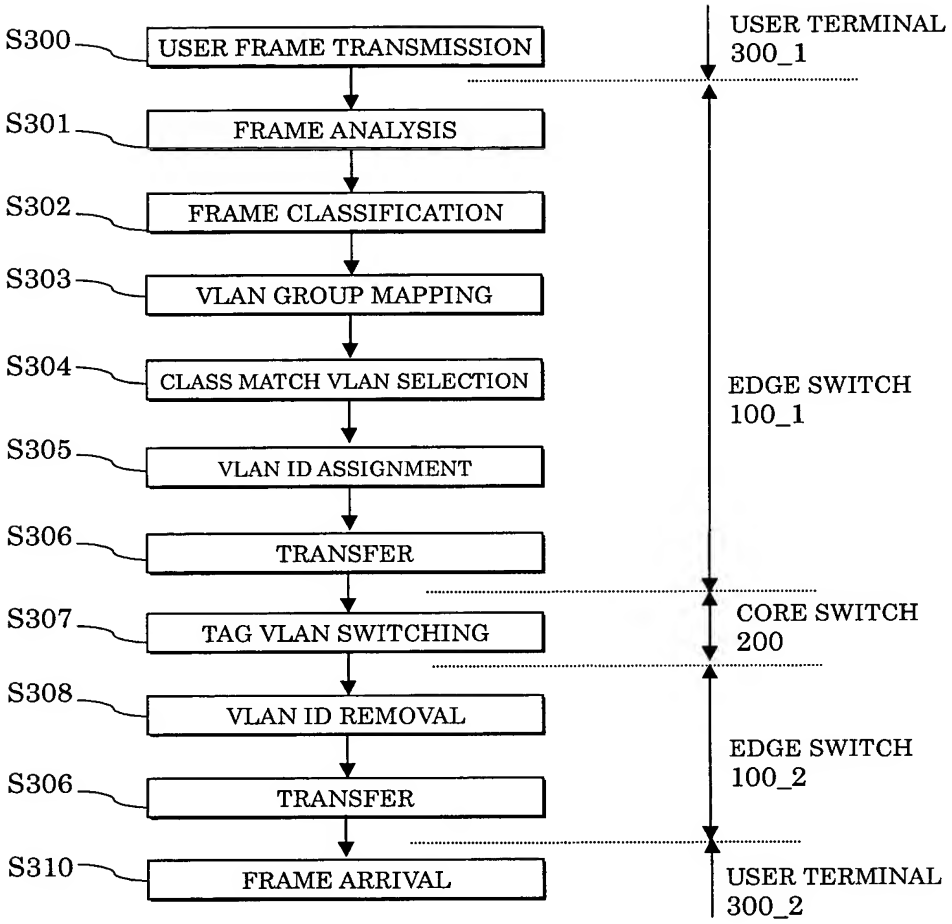

S300
USER FRAME TRANSMISSION
S301
FRAME ANALYSIS
S302
FRAME CLASSIFICATION
S303
VLAN GROUP MAPPING
S304
CLASS MATCH VLAN SELECTION
S305
VLAN ID ASSIGNMENT
S306
TRANSFER
S307
TAG VLAN SWITCHING
S308
VLAN ID REMOVAL
S306
TRANSFER
S310
FRAME ARRIVAL
USER TERMINAL 300_1
EDGE SWITCH 100_1
CORE SWITCH 200
EDGE SWITCH 100_2
USER TERMINAL 300_2

FIG.19

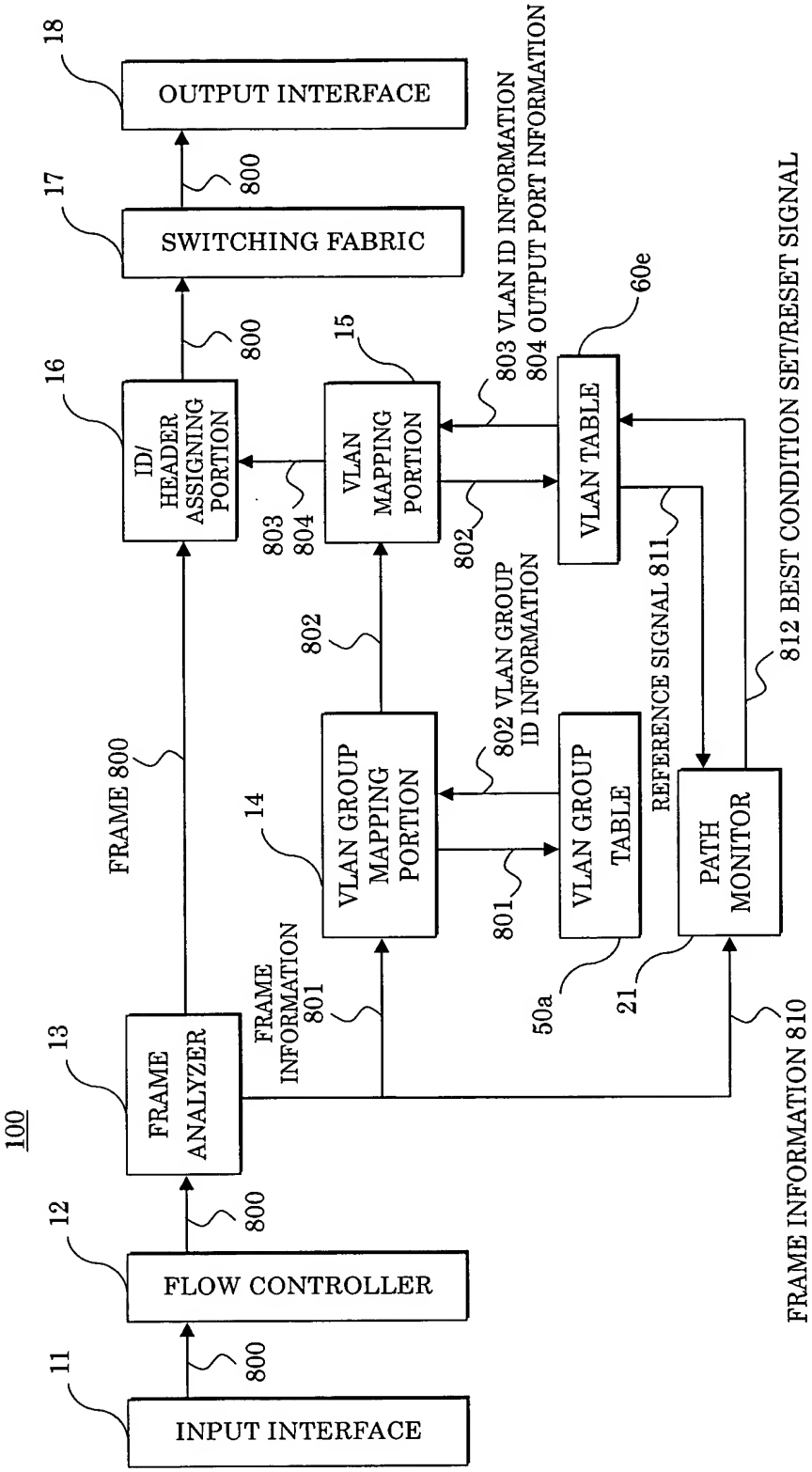

100
11
INPUT INTERFACE
800
12
FLOW CONTROLLER
800
13
FRAME ANALYZER
FRAME 800
FRAME INFORMATION 801
14
VLAN GROUP MAPPING PORTION
802
802 VLAN GROUP ID INFORMATION
801
VLAN GROUP TABLE
50a
21
PATH MONITOR
REFERENCE SIGNAL 811
812 BEST CONDITION SET/RESET SIGNAL
FRAME INFORMATION 810
16
ID/ HEADER ASSIGNING PORTION
803
804
15
VLAN MAPPING PORTION
802
803 VLAN ID INFORMATION
804 OUTPUT PORT INFORMATION
60e
VLAN TABLE
800
17
SWITCHING FABRIC
800
18
OUTPUT INTERFACE

FIG.20

60e

61 VLAN GROUP ID	62 NUMBER OF ELEMENTS	63 VLAN ID	64 OUTPUT PORT	70 BEST CONDITION	65 EFFECTIVENESS
0x0000	3	0x0000	NO.1	1	1
	3	0x0001	NO.2	0	1
	3	0x0002	NO.3	0	1
0x0001	3	0x0010	NO.1	0	1
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.

FIG.21

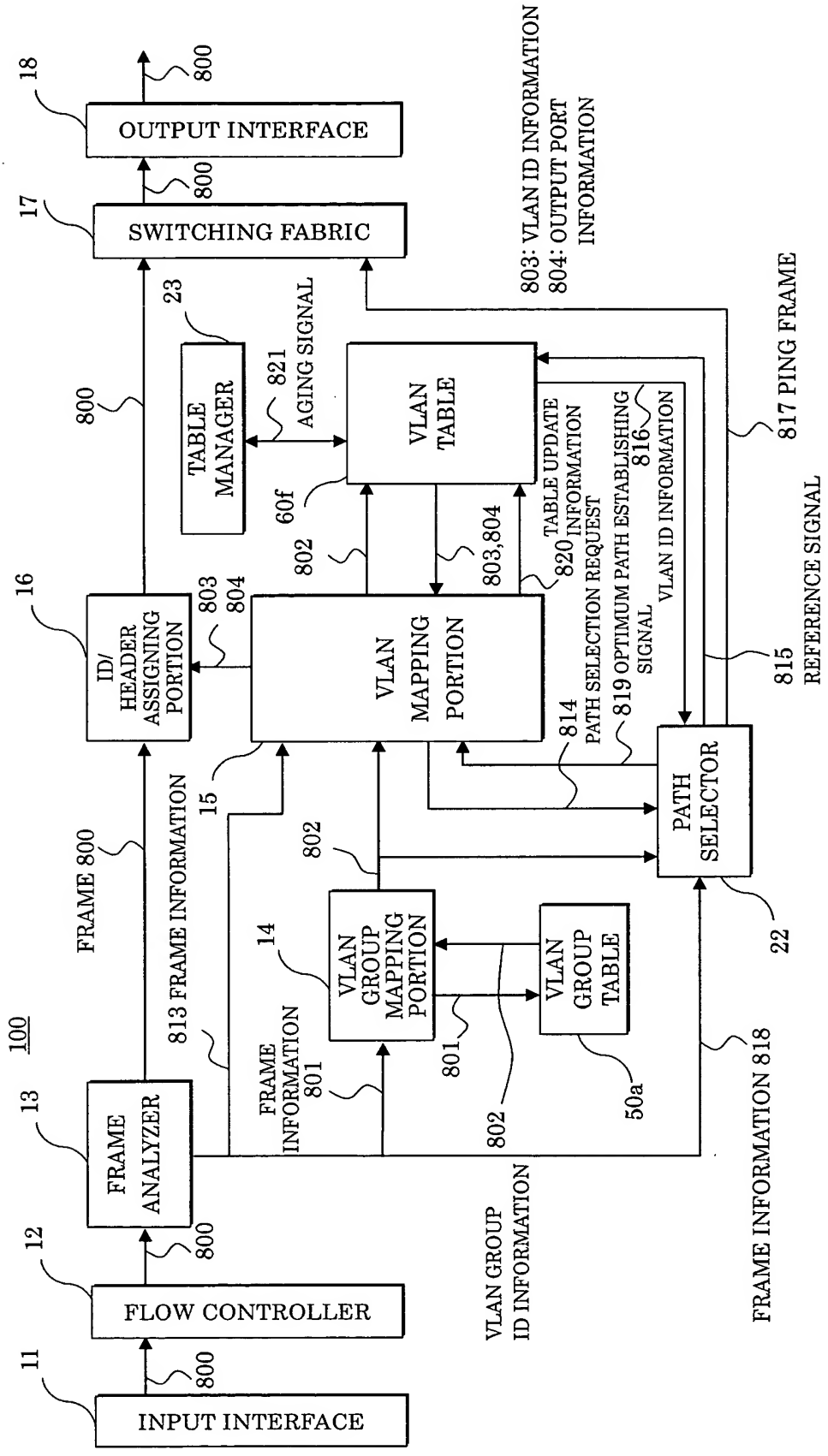

INPUT INTERFACE
FLOW CONTROLLER
FRAME ANALYZER
ID/ HEADER ASSIGNING PORTION
VLAN MAPPING PORTION
VLAN GROUP MAPPING PORTION
VLAN GROUP TABLE
PATH SELECTOR
TABLE MANAGER
VLAN TABLE
SWITCHING FABRIC
OUTPUT INTERFACE
100
11
12
13
14
15
16
17
18
22
23
50a
60f
800
801
802
803
804
803,804
813 FRAME INFORMATION
814 PATH SELECTION REQUEST
815 REFERENCE SIGNAL
816 VLAN ID INFORMATION
817 PING FRAME
818 FRAME INFORMATION
819 OPTIMUM PATH ESTABLISHING SIGNAL
820 TABLE UPDATE INFORMATION
821 AGING SIGNAL
803: VLAN ID INFORMATION
804: OUTPUT PORT INFORMATION
FRAME 800
FRAME INFORMATION 801
VLAN GROUP ID INFORMATION

FIG.22

60f

61 VLAN GROUP ID	62 NUMBER OF ELEMENTS	63 VLAN ID	64 OUTPUT PORT	71 IP ADDRESS	65 EFFECTIVENESS	72 HIT
0x0000	5	0x0000	NO.1	0.0.0.0	1	1
	5	0x0001	NO.1	aa.bb.cc.dd	1	1
	5	0x0002	NO.2	ee.ff.gg.hh	0	0
	5	0x0003	NO.3	ii.jj.kk.ll.	1	1
	5	0x0004	NO.2	(ww.xx.yy.zz)	1	1
0x0001	3	0x0010	NO.1	0.0.0.0	1	1
	.	.	.	.	.	0
	.	.	.	.	.	0
	.	.	.	.	.	1

FIG.23

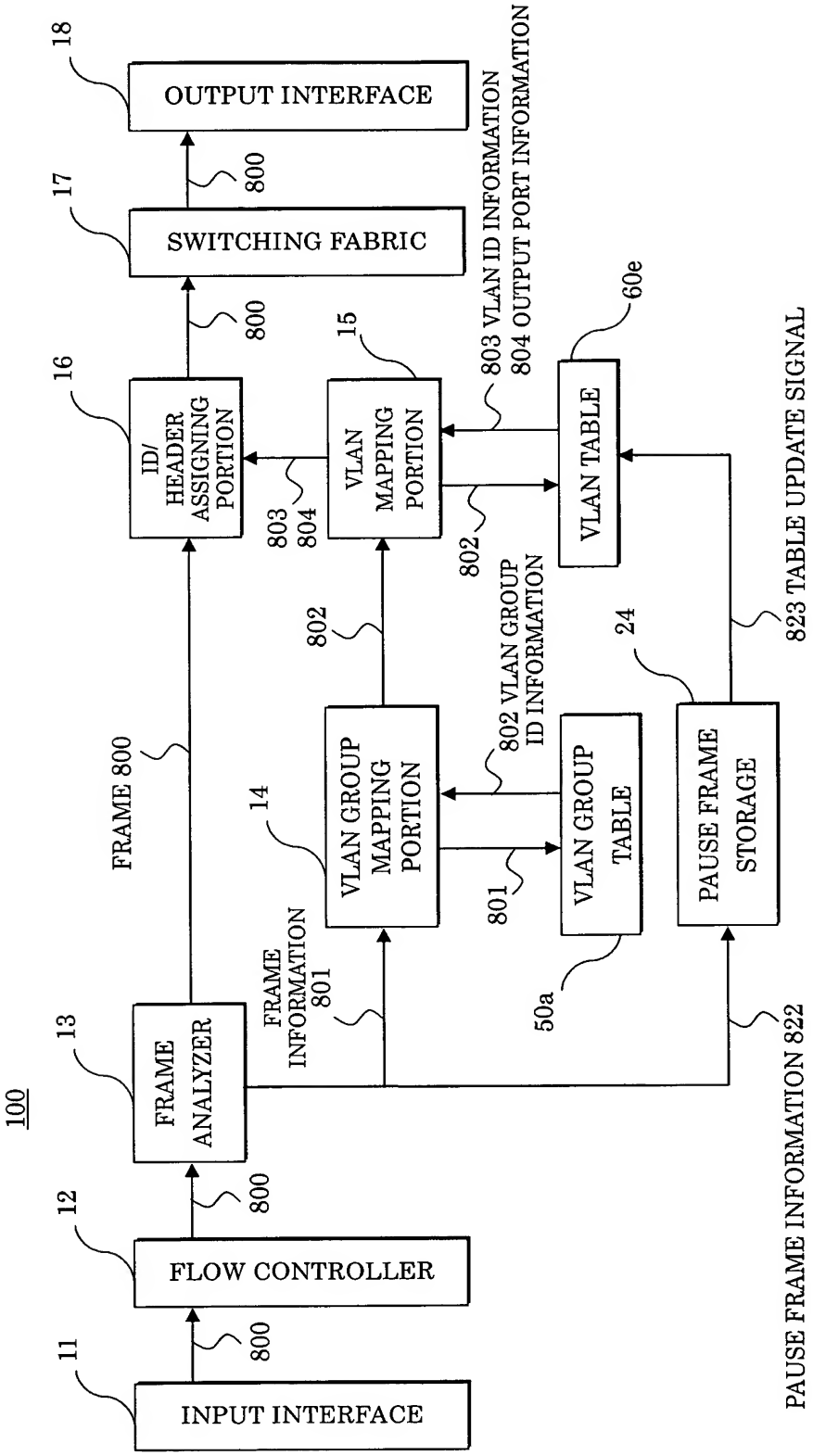

100
INPUT INTERFACE
11
800
FLOW CONTROLLER
12
800
FRAME ANALYZER
13
FRAME 800
FRAME INFORMATION 801
ID/ HEADER ASSIGNING PORTION
16
800
SWITCHING FABRIC
17
800
OUTPUT INTERFACE
18
VLAN GROUP MAPPING PORTION
14
801
VLAN GROUP TABLE
50a
802 VLAN GROUP ID INFORMATION
802
VLAN MAPPING PORTION
15
803
804
802
803 VLAN ID INFORMATION
804 OUTPUT PORT INFORMATION
VLAN TABLE
60e
PAUSE FRAME STORAGE
24
PAUSE FRAME INFORMATION 822
823 TABLE UPDATE SIGNAL

FIG.24

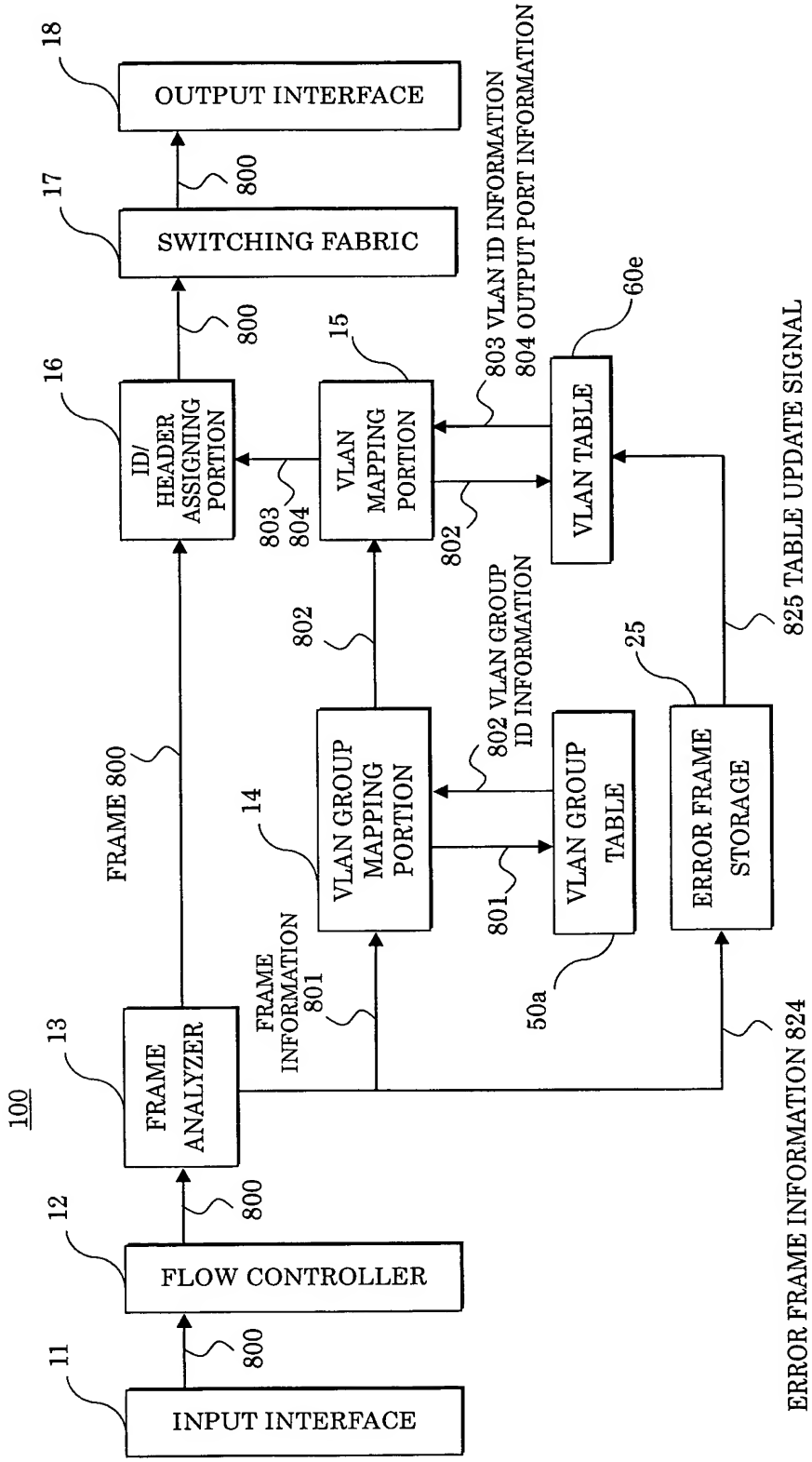

100
11
INPUT INTERFACE
800
12
FLOW CONTROLLER
800
13
FRAME ANALYZER
FRAME 800
FRAME INFORMATION 801
14
VLAN GROUP MAPPING PORTION
802
802 VLAN GROUP ID INFORMATION
801
VLAN GROUP TABLE
50a
25
ERROR FRAME STORAGE
825 TABLE UPDATE SIGNAL
ERROR FRAME INFORMATION 824
16
ID/ HEADER ASSIGNING PORTION
800
803
804
15
VLAN MAPPING PORTION
802
803 VLAN ID INFORMATION
804 OUTPUT PORT INFORMATION
60e
VLAN TABLE
17
SWITCHING FABRIC
800
18
OUTPUT INTERFACE

FIG.25

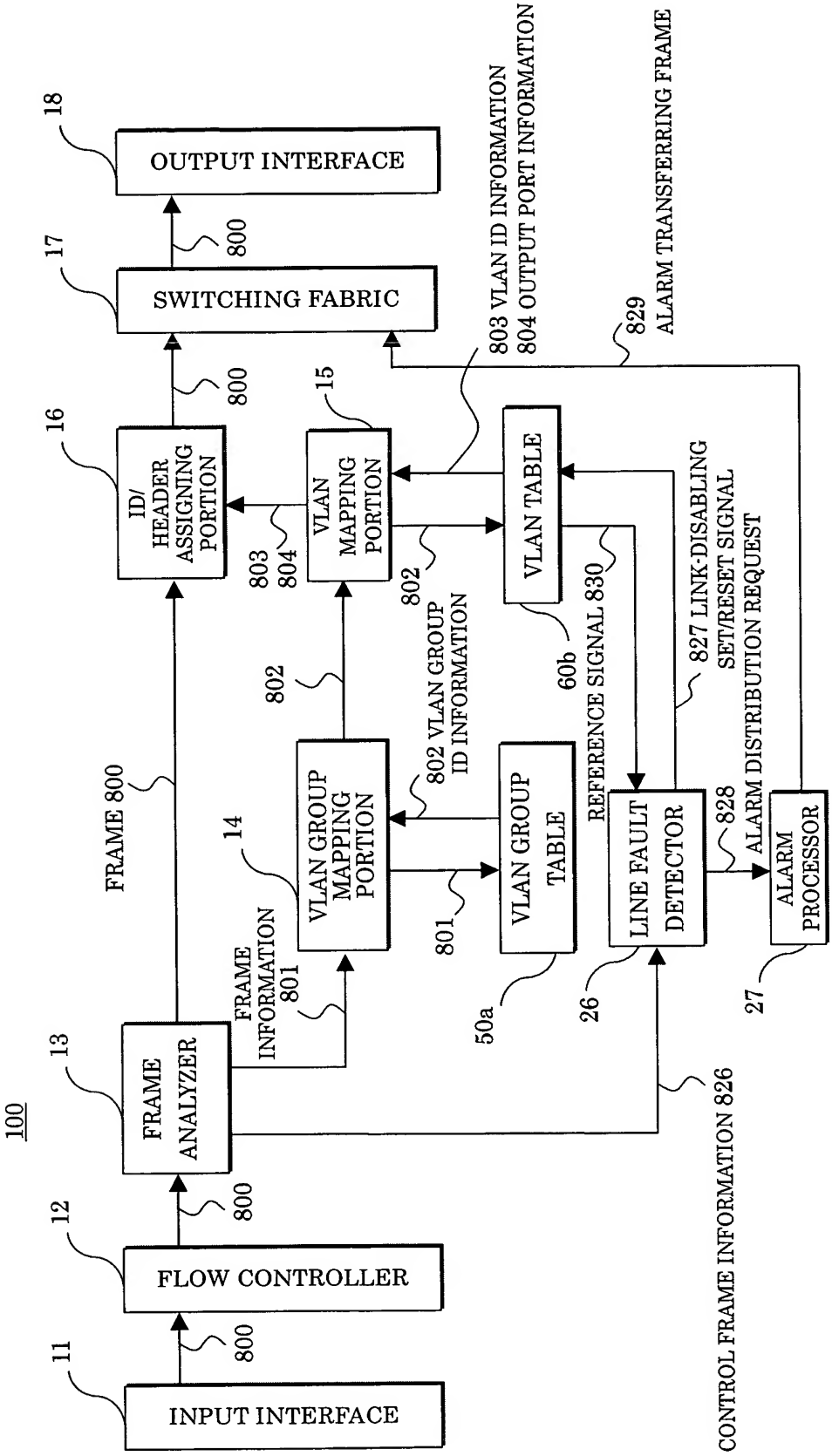

100
INPUT INTERFACE
11
800
FLOW CONTROLLER
12
800
FRAME ANALYZER
13
FRAME INFORMATION 801
FRAME 800
800
ID/ HEADER ASSIGNING PORTION
16
800
SWITCHING FABRIC
17
800
OUTPUT INTERFACE
18
VLAN GROUP MAPPING PORTION
14
802 VLAN GROUP ID INFORMATION
802
VLAN MAPPING PORTION
15
803 VLAN ID INFORMATION
804 OUTPUT PORT INFORMATION
803
804
802
VLAN GROUP TABLE
801
50a
VLAN TABLE
60b
REFERENCE SIGNAL 830
LINE FAULT DETECTOR
26
827 LINK-DISABLING SET/RESET SIGNAL
828 ALARM DISTRIBUTION REQUEST
ALARM PROCESSOR
27
829 ALARM TRANSFERRING FRAME
CONTROL FRAME INFORMATION 826

FIG.26

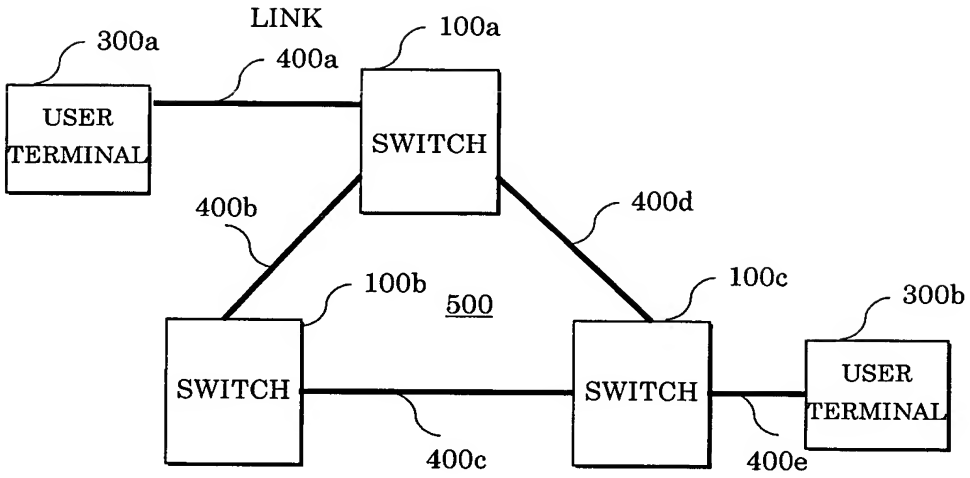
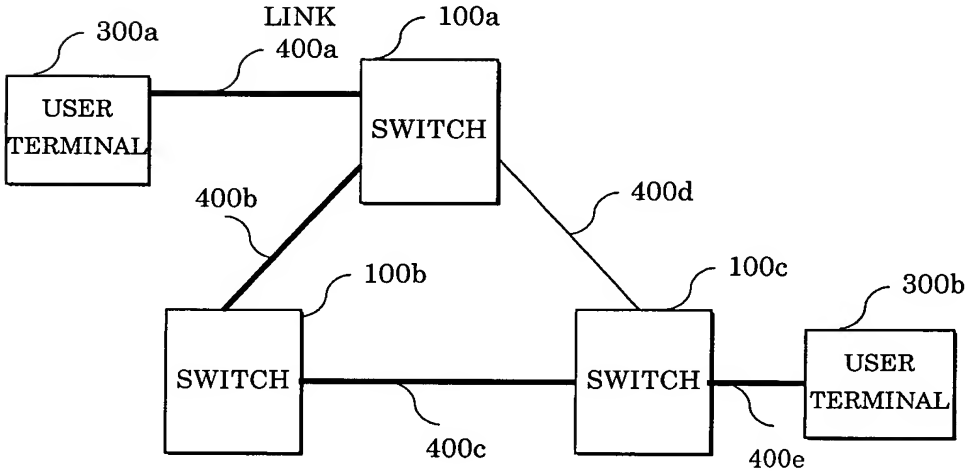

LINK
300a
400a
100a
USER TERMINAL
SWITCH
400b
400d
100b
500
100c
300b
SWITCH
SWITCH
USER TERMINAL
400c
400e

FIG.27


300a
LINK
400a
100a
USER TERMINAL
SWITCH
400b
400d
100b
100c
300b
SWITCH
SWITCH
USER TERMINAL
400c
400e